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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : B62K 3/00 — A1

(11) International Publication Number: WO 00/41925

(43) International Publication Date: 20 July 2000 (20.07.00)

(21) International Application Number: PCT/ZA00/00002

(22) International Filing Date: 10 January 2000 (10.01.00)

(30) Priority Data:
99/0008 10 January 1999 (10.01.99) ZA

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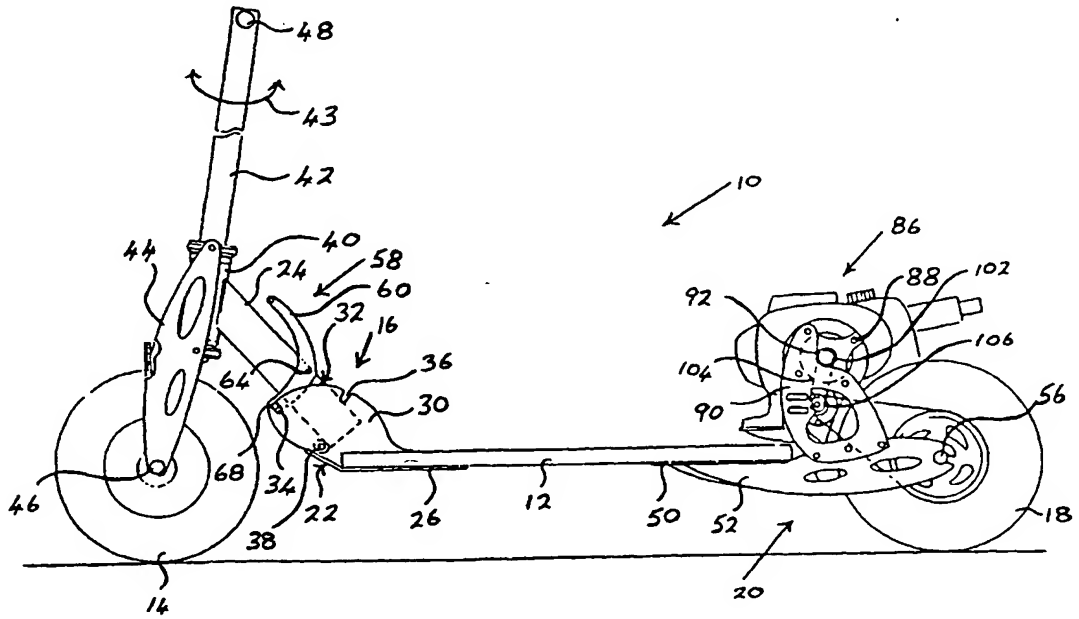
(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: MOTORIZED SCOOTER



(57) Abstract

The invention provides a vehicle which includes a platform (12), a steerable front wheel (14) which is mounted to a first end of the platform (12), at least one rear wheel (18) which is mounted to a second end of the platform (12), opposing the first end, and motor means (86) for driving the rear wheel (18), and wherein the platform (12) is resiliently flexible to permit limited movement of the first wheel relative to the rear wheel (18).

MOTORIZED SCOOTER

BACKGROUND OF THE INVENTION

This invention relates to a vehicle which is in the nature of a motorized scooter.

Normally a scooter has two wheels and the invention is described hereinafter with reference to a vehicle of this kind. It is to be understood though that the scope of the invention is not limited in this regard and that the principles which are described herein are applicable with modifications which may be apparent to those skilled in the art to vehicles with three or more wheels.

The applicant is aware of a two-wheel motorized scooter which includes a platform mounted to a chassis-type structure. A steering column to a front wheel is collapsible by being folded about a central pivot to allow the scooter to be compactly stored. With this action the front wheel does not move, and only the steering column is folded. The rear wheel is driven by means of a small pinion wheel which is powered by a motor and which is frictionally engaged with the rear wheel at a circumferential location thereof.

The aforementioned scooter exhibits a number of drawbacks. As the vehicle is inexpensive it is not economically viable to fit shock absorbers. Consequently the ride comfort is poor for as the scooter travels over an uneven surface shocks and bumps are directly transmitted to a user standing on the platform, and handle bars, attached to the steering column, can shake or vibrate to such an extent that it becomes difficult for a user to steer the vehicle accurately, and the scooter may become unstable as its speed increases. Yet another problem arises from the relatively short lifetime of the pinion drive

wheel which wears rapidly and which therefore requires periodic adjustment and replacement. A further disadvantage is that the rear wheel is automatically driven whenever the engine runs. This can be disconcerting and, at the very least, it requires the engine to be turned off or the rear wheel to be elevated when the vehicle is brought to a standstill.

SUMMARY OF INVENTION

The invention provides a vehicle which includes a platform, a steerable front wheel which is mounted to a first end of the platform, at least one rear wheel which is mounted to a second end of the platform, opposing the first end, and motor means for driving the rear wheel, and wherein the platform is resiliently flexible to permit limited movement of the first wheel relatively to the rear wheel.

The relative movement of the wheels, permitted by the resilient platform, is quite distinct from rotational movement of the wheels which takes place when the vehicle travels over the ground. The resilient platform moves in a way which allows the front and rear wheels to move up and down, to a limited extent, relatively to, and independently of, each other, similar to the movement which is allowed by a dampened shock absorber. This gives a smoother ride, even at high speed, over rough ground.

First mounting means may be used for fixing the front wheel to the first end and second mounting means may be used for fixing the rear wheel to the second end. The platform, between the first and second mounting means, is not braced by any additional means.

The platform may be of any appropriate resilient or flexible material and for example is made from a plastics material. Preferably though the platform is made from multi-plywood.

The first mounting means may include support structure which is attached to the platform and a support member which is pivotally mounted to the support structure and which is movable between first and second positions, and means for releasably retaining the support member in the first position.

The retaining means may also be used for releasably retaining the support member in the second position.

The vehicle may include a steering column which is rotatably mounted to the support member and the front wheel may be mounted to the steering column.

The pivotal mounting of the support members, to the support structure, may be done in any appropriate way and preferably is achieved using inter-engaging complementary male and female mounting members of any appropriate shape but which, in a preferred embodiment, are conical in shape. The mounting members permit adjustments to be made to compensate for wear and tear which otherwise could give rise to excessive movement of the support member, and hence of the steering column, relatively to the support structure.

The motor means may be of any appropriate type and preferably is a two- or four- stroke petrol powered engine. The motor means may drive the rear wheel in any suitable way and preferably use is made of a belt or chain drive between the motor means and the rear

wheel.

According to a preferred aspect of the invention drive from the motor means is transferred to the rear wheel through the medium of a centrifugal clutch. The clutch is adjusted in such a way that with the motor means at idling speed the clutch is disengaged and no drive is imparted to the rear wheel. On the other hand when the speed of the motor means is increased the centrifugal clutch is automatically engaged and drive is transmitted to the rear wheel.

A tension adjuster may be provided for the belt or chain drive.

The invention also provides a vehicle which includes a platform, two spaced plates which are secured to a first end of the platform, a support member which is mounted for pivotal movement between the plates and which is movable between first and second positions, means for retaining the support member, as required, in the first position or in the second position, a steering column which is fixed to the support member and which is rotatable at least to a limited extent relatively thereto, a first wheel which is mounted to the steering column, a second wheel which is mounted to a second end of the platform, and motor means for driving the second wheel.

The invention further extends to a vehicle which includes a resilient platform, a motor-driven rear wheel at one end of the platform, a steering column, to which is mounted a front wheel, at an opposing end of the platform, the steering column and the front wheel being movable in unison between operative and storage positions, and means for retaining

the steering column and the front wheel, according to requirement, in the operative position or in the storage position.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is further described by way of example with reference to the accompanying drawings in which :

Figure 1 is a side view of a vehicle according to the invention in an assembled state, illustrating principal components of the vehicle;

Figure 2 is a view similar to that of Figure 1 but with the vehicle in a folded or collapsed state;

Figure 3 is a side view in enlarged detail of a mounting arrangement for a front wheel of the vehicle shown in Figure 1;

Figure 4 is a view at right angles to that shown in Figure 3 illustrating the way in which adjustments are made to the mounting arrangement;

Figure 5 is a side view of a rear portion of the vehicle illustrating a drive arrangement; and

Figure 6 is a plan view, at right angles to that shown in Figure 5, illustrating certain structural details of the drive arrangement.

DESCRIPTION OF PREFERRED EMBODIMENTS

Figures 1 and 2 of the accompanying drawings illustrate a vehicle 10, from the side, in an assembled or operative condition and in a folded or storage condition respectively.

Figures 1 and 2 are intended to illustrate certain principles only and hence do not

completely illustrate the vehicle. Further details of construction of the vehicle are shown in Figures 3 to 6.

The vehicle 10 includes a platform 12 which is made from a shaped sheet of multi-plywood of a suitable thickness. The multi-plywood is resiliently flexible to a limited extent but on the other hand has substantial strength and is well capable of supporting the weight of an adult who may stand on the platform.

The vehicle has a front wheel 14 which is attached to a first end of the platform using a first mounting mechanism 16, and a rear wheel 18 which is attached to a second end of the platform, opposing the first end, using a second mounting mechanism 20. The wheels may have solid tyres but preferably are inflated.

The first mounting mechanism 16 includes support structure 22 and a support member 24. The structure 22 includes a plate 26 which is secured to an underside of the platform 12 at the first end and two spaced plates 30, which are in the nature of cam plates, extend upwardly from the plate 26 on opposed inner sides of a slot, not visible. in the leading end of the platform 12. The cam plates 30 have arcuate cam surfaces 32 with stop slot formations 34 and 36 at opposed ends of the cam surfaces. Only one plate 30 is visible in Figures 1 and 2.

The support member 24 is mounted between the plates 30 and is pivotally movable about a pivot point 38. The nature of this pivotal mounting is described hereinafter with reference to Figures 3 and 4.

The support member 24, at its upper end, has a collar 40 and a steering column 42 is rotatably located inside the collar by being mounted to bushes or bearings, not shown, fixed to the collar. The column 42 is not movable in the axial direction of the collar and is only rotatable about its longitudinal axis, relatively to the collar, as is indicated by a double-headed arrow 43 in Figure 1. The front wheel 14 is mounted to fork structure 44 at a lower end of the steering column and is rotatable about an axis 46.

The steering column at its upper end has handlebars 48 which are usable, in a manner known per se, for steering the vehicle. Hand-operated brake levers (not shown) are attached to the handlebars and are connected via cables to calipers which carry brake pads on the front and rear wheels. These aspects are known in the art and consequently are not further described herein.

The second mounting mechanism 20 includes a plate 50 which is attached to an underside of the second end of the platform 12. Two spaced curved brackets 52 extend from the plate 50 to the rear of the platform. The wheel 18 is mounted between the brackets 52 (see Figure 6) and is rotatable about an axle 56.

Figures 3 and 4 are views at right angles to one another, on an enlarged scale, of the mounting arrangement used for the front wheel of the vehicle.

A linkage 58, which has two spaced, curved plates 60 and 62, is mounted for pivotal movement about an axle 64 on the member 24. The plates 60 and 62 extend upwardly and are connected at their upper ends by means of a cross piece 66. A catch bar 68

extends between lower ends of the plates 60 and 62 and is engageable with the formations 34 or the formations 36 depending on the position of the support member 24.

A spring 70, hooked between the catch bar 68 and the member 24, acts on the linkage 58 and biasses the linkage in an anti-clockwise direction, about the axle 64, as is shown by an arrow 72. In this way the catch bar 68 is at all times biassed in a direction which enables it automatically to engage with respective stop formations 34 or 36 when the catch bar is brought to a position which is coincident with the position of a respective stop formation.

The pivot point 38 is formed by a bush 74 which is fixed to the member 24 and which has axially aligned conical recesses 76 and 78 in opposed outer surfaces.

Cap screws 80 and 82 are mounted to the opposed plates 30 respectively and lock nuts 84 are used to lock the cap screws to the plates. The cap screws have opposed leading ends which are conically tapered in a manner which is complementary to the corresponding conical recess 76 or 78, as the case may be.

Figure 1 shows the vehicle in an operative position while Figure 2 shows the vehicle in a storage position. If the cross piece 66 is gripped and pulled to rotate the linkage about the axle 64 in a clockwise direction, then the catch bar 68 is moved against the action of the spring 70 out of engagement with the respective formations 34 or 36 as the case may be. As the steering column is pivoted about the axis 38 the catch bar 68 rides on the cam surfaces 32 until the catch bar reaches the other stop formations 36 or 34, as the case

may be, whereupon the catch bar engages automatically with the stop formations due to the biassing action of the spring 70.

Referring to Figures 5 and 6 the rear wheel 18 is driven by a petrol motor 86 which is schematically illustrated and which may be a two-stroke or four-stroke motor. The motor is directly attached by means of studs 88 to spaced plates 90 and 92 which extend upwardly from the brackets 52. The axle 56 about which the wheel 18 is rotatable is between the brackets 52. A bearing 94 is mounted between two plates 96 and 98 which are also secured to the studs 88. The bearing provides a rotatable support for a shaft 100 to which is fixed a cog 102. An endless chain 104 is engaged with the cog and is also engaged with a relatively larger gear 106 fixed to an axle 108. A second cog 110 on the axle 108 is coupled by means of an endless chain 112 to a large drive gear 114 fixed to the axle 56 of the wheel 18.

The shaft 100 extends from a centrifugal clutch 116 which is coupled to an output drive shaft of the motor 86. The centrifugal clutch is of a type which, at a low speed of rotation, does not impart any drive to the shaft 100. As the rotational speed increases centrifugal forces which are generated cause engagement of various clutch members, in a manner which is known, and rotational drive is gradually and smoothly imparted to the shaft 100 thereby causing rotation of the cog 102. Rotational movement is then transmitted via the drive mechanism 104, 106, 110, 112 and 114, to the rear wheel 18.

Any slack which may, from time to time, arise in the chain 112 can be taken up by a tension-adjusting device 120 which is movable relatively a stud 122 and which bears on

an outer surface of the chain, and which can be locked in position. The device 120 can also be biassed by a spring (not shown) towards the chain, as is indicated by an arrow 124, to make the device self-adjusting. A similar device 120A can be desired to adjust the tension in the chain 104.

The vehicle has been described with two chain drives between the clutch and the rear wheel. This is useful when the rear wheel is relatively large, or for a bigger vehicle which is intended to carry an increased mass, due to the gearing effect. With a smaller rear wheel, or vehicle, a single chain drive can be used between the clutch and the rear wheel.

The vehicle of the invention has a number of significant benefits. In the first instance the platform 12, which does not have an underlying stiffening chassis, as is the case with prior art devices which are known to the applicant, is slightly resiliently flexible and hence provides a suspension system which in practice has proved to be highly effective for the vehicle. The wheels 14 and 18 are rigidly mounted to the platform without making use of shock-absorbing devices. The resilience of the platform 12 has been found to be adequate to absorb shock loadings which arise from most uneven road surfaces, and helps to eliminate or dampen vibrations which occur, even at relatively high speeds, for it allows the front and rear wheels to move independently of each other, to a limited extent, up or down, depending on road conditions.

Another factor is that the steering column 42 is rigid and is mounted via the support member 24 to the platform 12 using an arrangement of the type shown particularly in Figure 4 which allows the components of the mounting arrangement to be adjusted to

compensate for play, between the components, which may arise due to normal usage of the vehicle. All that is necessary is that one or both of the cap screws are rotated inwardly, deeper into the corresponding conical recesses, to take up any slack which may occur, for example due to wear and tear. On the other hand the mounting arrangement does permit pivotal adjustment of the steering column and front wheel from the operative position of Figure 1 to the storage or transport portion of Figure 2. The mounting arrangement has been found to be technically effective and cost effective.

The direct chain drive shown in Figures 5 and 6, transferring drive from the centrifugal clutch 116 to the rear wheel 18, also holds benefit for it is unnecessary, as with prior art scooters, to turn the engine off or raise the rear wheel when the vehicle is to be brought to a halt. The rapid wear of the pinion-type friction drive, encountered in prior art scooters, is eliminated. The direct chain drive is long-lasting and an increase in length in either chain, due to wear and tear, is readily compensated for by means of the respective tensioner 120 or 120A.

CLAIMS

1. A vehicle which includes a platform, a steerable front wheel which is mounted to a first end of the platform, at least one rear wheel which is mounted to a second end of the platform, opposing the first end, and motor means for driving the rear wheel, and wherein the platform is resiliently flexible to permit limited movement of the first wheel relatively to the rear wheel.

2. A vehicle according to claim 1 wherein the platform is made from multi-plywood.

3. A vehicle according to claim 1 or 2 wherein first mounting means are used for fixing the front wheel to the first end and second mounting means are used for fixing the rear wheel to the second end, the platform extending between the first and second mounting means.

4. A vehicle according to claim 3 wherein the platform, between the first and second mounting means, is not braced by any additional means.

5. A vehicle according to claim 3 or 4 wherein the first mounting means includes support structure which is attached to the platform and a support member which is pivotally mounted to the support structure and which is movable between first and second positions, and means for releasably retaining the support member in the first position.

6. A vehicle according to claim 5 wherein the retaining means is also used for releasably retaining the support member in the second position.

7. A vehicle according to claim 5 or 6 which includes a steering column which is rotatably mounted to the support member and the front wheel is mounted to the steering column.

8. A vehicle according to claim 7 wherein the support means is pivotally mounted to the support structure using inter-engaging complementary male and female mounting members which are conical in shape.

9. A vehicle according to claim 8 wherein the support structure includes two spaced plates which are fixed to the platform and the support member is pivotally movable between the plates.

10. A vehicle according to any one of claims 1 to 9 wherein drive from the motor means is transferred to the rear wheel through the medium of a centrifugal clutch.

11. A vehicle which includes a platform, two spaced plates which are secured to a first end of the platform, a support member which is mounted for pivotal movement between the plates and which is movable between first and second positions, means for retaining the support member, as required, in the first position or in the second position, a steering column which is rotatably fixed to the support member, a first wheel which is mounted to the steering column, a second wheel which is

mounted to a second end of the platform, and motor means for driving the second wheel.

12. A vehicle which includes a resilient platform, a motor-driven rear wheel at one end of the platform, a steering column, to which is mounted a front wheel, at an opposing end of the platform, the steering column and the front wheel being movable in unison between operative and storage positions, and means for retaining the steering column and the front wheel, according to requirement, in the operative position or in the storage position.

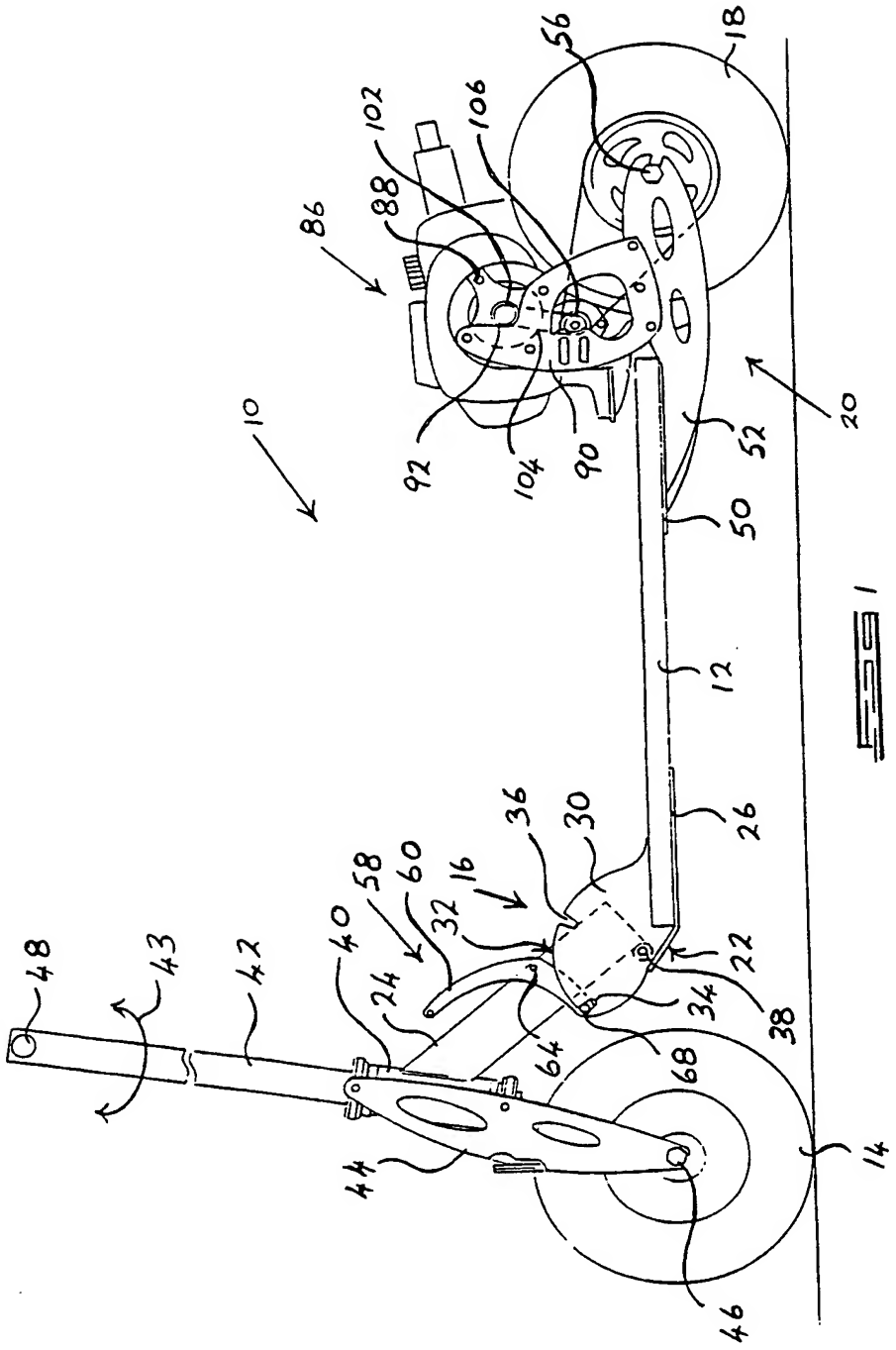

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Fig 1

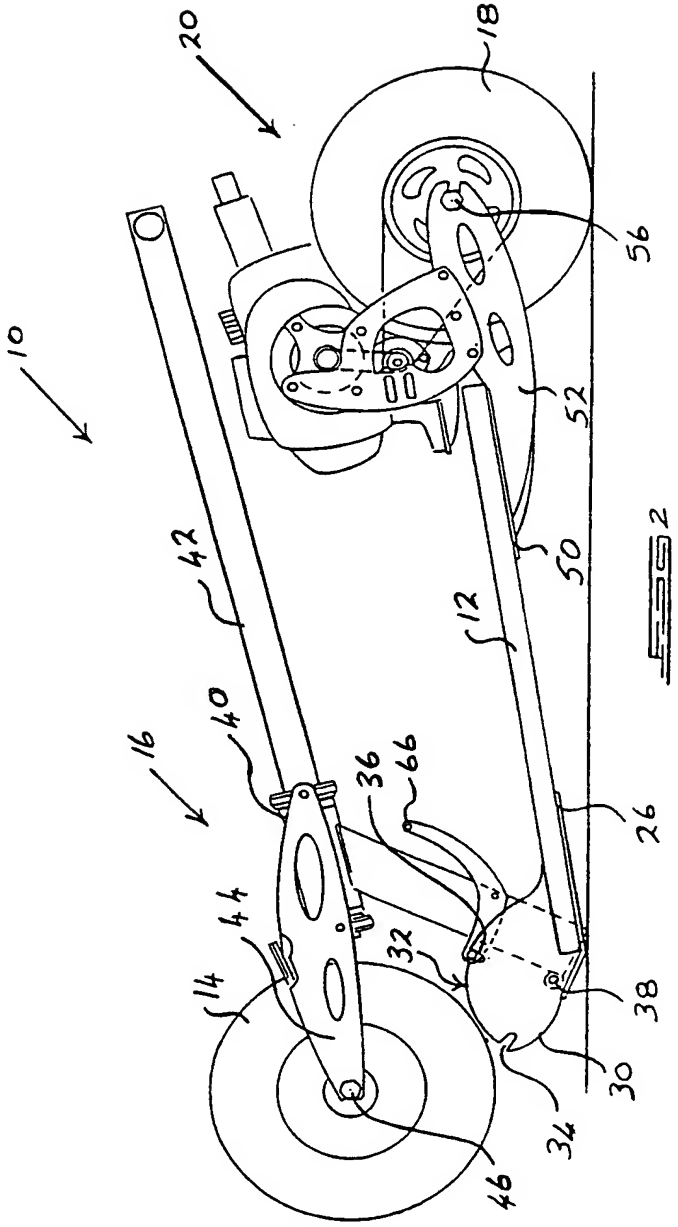
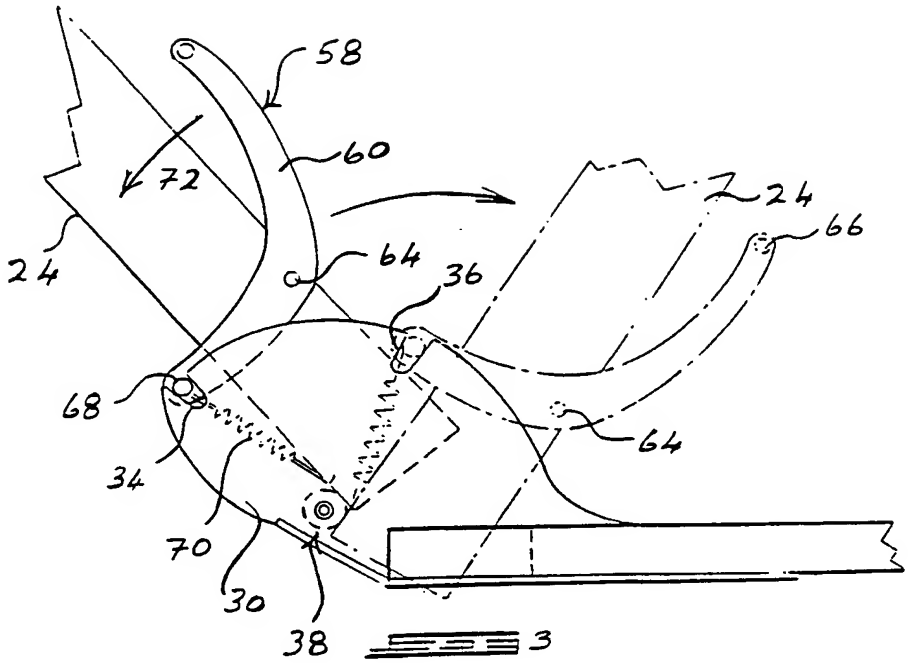


Fig 2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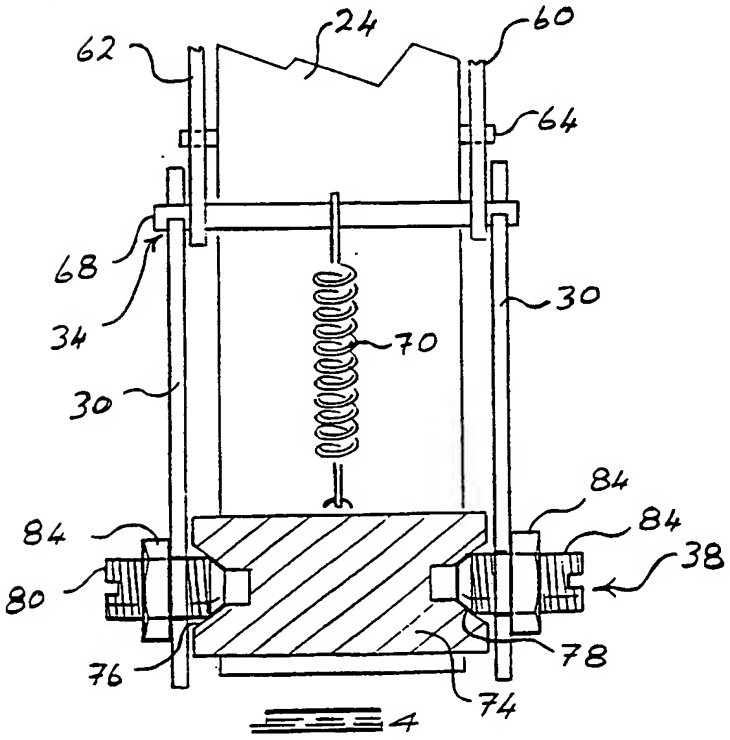
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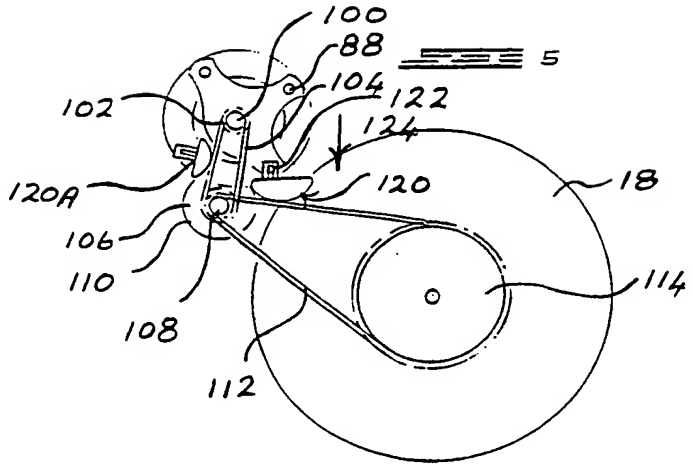
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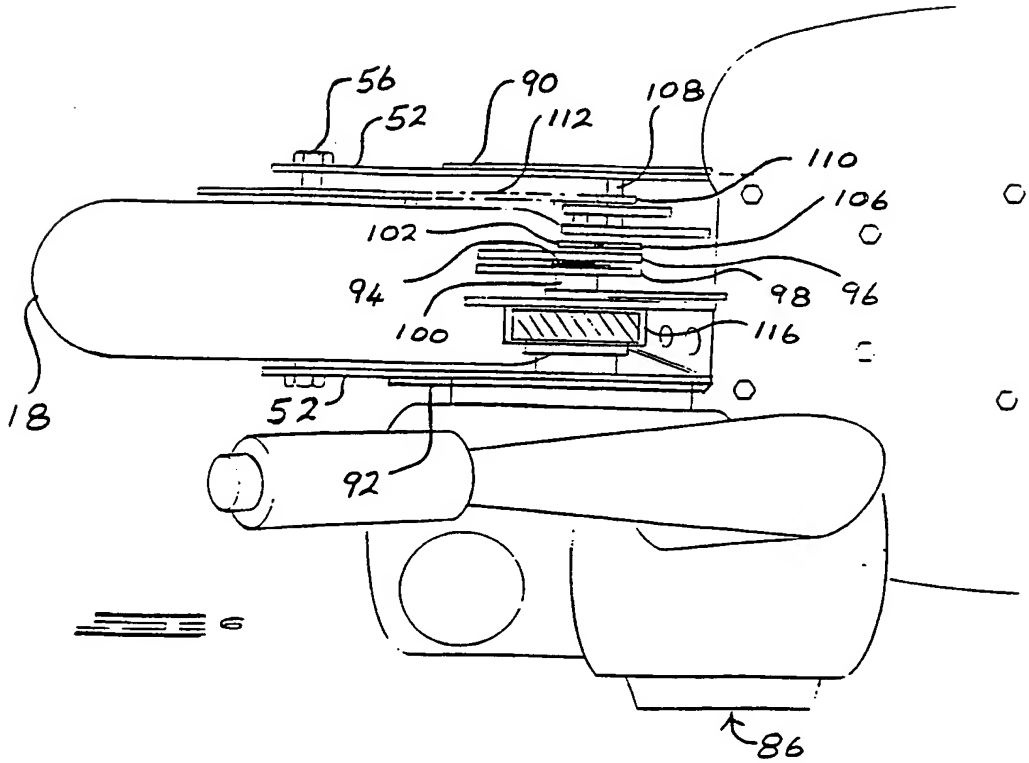
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